# *"Reciprocal fairness and gift exchange practices in the labor contract: Econometric analysis on a French firms survey"*

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*First draft- Comments very welcome-*

*Abstract*:

We aim at investigating to what extent reciprocal considerations, exhibited by employers and employees, should lead to stable gift exchange practices in the labor contract, giving rise to non-compensating wage differentials among industries. We use the concept of Sequential Reciprocity Equilibrium developed by Dufwenberg & Kirchsteiger (1998) to incorporate players' preferences for reciprocity in their utility function. We model the labor relation through a one shot sequential gift giving game between an employer who proposes a wage given the employee's profitability level as exogenous and an employee who chooses his level of effort.
We show that successful gift exchange practices may arise if both players are actually motivated by reciprocity. Even though intentions act as a catalyst of opportunistic behaviors, the respect of the equity norm makes mutual cooperation more likely.
We propose a direct evaluation of the determinants of gift exchange practices between French employers and employees, estimating the probabilities to observe productivity increases following upon the settlement of rent-sharing agreements in the firm. Whether we estimate the probability for the employer to propose a rent-sharing agreement or the probability for the employees to raise their effort, we show that there exists an endogeneity bias related to the variable chosen as proxy to express the agents' perception of their opponent's fairness. This result gives support to the hypothesis that French employers and employees' decisions are directly influenced by reciprocity concerns. Our results give support to the Akerlof & Yellen's fair wage effort hypothesis as an explanation of the persistence of non-compensating wage differentials.

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# 1. Introduction

Econometric studies initiated by Slichter (1950) and pursued more recently by Dickens & Katz (1987), Krueger & Summers (1988), Oswald & Sanfey (1994) reach the conclusion that sizeable rents are paid by employers in addition to the competitive wage, giving rise to non-compensating wage differentials. Homogenous employees seem to get paid differently according to the industry or firm they belong to. Numerous studies based on the European labor market, notably Abowd & Allain (1994), Hildreth & Oswald (1992), Goux & Maurin (2002), not only confirm the non-compensating nature of wage determination but also show that the phenomenon transcends the institutional contexts of the surveyed countries. Moreover, these studies highlight that the wage structure can't be explained by any form of unequal distribution of the unobserved workforce quality amongst industries. Indeed, as employees move from low wage to high wage firms (or vice versa), they incur notable changes in the level of their compensation even though their quality hasn't had time to improve or decrease through the transition (Abowd, Kramarz & Margolis, 1999). These evidences suggest that non-competitive elements, intrinsic to the nature of the work relations established between employers and employees, enter the wage setting process.

A theoretical way for explaining this stylized fact can be drawn from the fair wage effort hypothesis developed by Akerlof and Yellen (1988, 90) according which wage premiums stem from gift exchange practices initiated by the employer. Wage premiums are offered in the hope that the employees will reply by productivity increases. Employees are sensitive to norms of compensation they consider fair to receive and the fact that these norms differ from one firm to another justifies the existence of non-compensating wage differentials. This view has recently received strong support from various experiments carried out notably by Fehr & al. (1996, 1998). In their gift exchange experiments, they observed that their subjects tend to behave reciprocally, rewarding fair proposals and punishing greedy opponents.

The aim of this paper is twofold. On a theoretical point of view, we aim at investigating to what extent reciprocal considerations, exhibited by employers and employees, should lead to stable gift exchange practices in the labor contract. We use a basic sequential gift giving game between an employer who proposes a wage given the employee's profitability level as exogenous and an employee who chooses his level of effort. We use the concept of Sequential Reciprocity Equilibrium developed by Dufwenberg & Kirchsteiger (1998) to incorporate players' preferences for reciprocity in their utility function.

We show that successful gift exchange practices may arise if both players are actually motivated by reciprocity. More precisely, we show that even though intentions act as a catalyst of opportunistic behaviors, the respect of the equity norm makes mutual cooperation more likely. Thus stable gift exchange practices may arise between the employer and employee without requiring too unrealistic conditions on their intrinsic motivation for reciprocity.

The second aim of this paper is to propose a direct evaluation of the determinants of gift exchange practices between French employers and employees, estimating the probabilities to observe productivity increases following upon the settlement of rent-sharing agreements in the firm. We use a French database extracted from the REPONSE 98 survey. The information being available both for the employer and the employee and the presence of more subjective questions in the survey make this database particularly suited for the estimations of the determinants of reciprocity behaviors

Whether we estimate the probability for the employer to propose a rent-sharing agreement or the probability for the employees to raise their effort, we show that there exists an endogeneity bias related to the variable chosen as proxy to express the agents' perception of their opponent's fairness. This result gives support to the hypothesis that employers and employees' decisions are directly influenced by reciprocity concerns. Moreover, the estimations show that the equity (fairness) norms upon which the agents base their decisions of reward or retaliation are actually determined at the firm's level. This latter result gives support to the Akerlof & Yellen's fair wage effort hypothesis as an explanation of the persistence of non-compensating wage differentials.

## 2. Fairness considerations and labor relations.

An appealing way to explain the persistence of non-compensating wage differentials lies in the fair-wage effort hypothesis developed by Akerlof and Yellen (1988, 1990). According to this hypothesis, employers and employees base their relationship on gift exchanges. The employer offers a higher wage expecting the employees to raise their productivity in return. The employees compare their actual wage to the norm they consider fair to receive (*fair wage)* and determine whether they should actually raise their effort and remain loyal to the employer's goals. The incompleteness of the labor contract involves that the employees are able to adjust their effort to the level of their compensation. Giving the fair wage to the employees enables to enforce effort maximization without resorting to costly mechanisms of control and punishment. Although Akerlof & Yellen (1990) base their interpretation on psychological and sociological observations, it represents an actual challenge in terms of modeling. Indeed, the wage premiums shouldn't, theoretically, constitute a sufficient incentive to have the employees maximize their effort. The situation described by Akerlof & Yellen is a typical *prisoner's dilemma.* Whatever the wage proposal, the employee who seeks to maximize her final payoff should shirk. Anticipating such a behavior, the employer should offer the market-clearing wage. The *fair wage* psychological and sociological foundations involve that the agents determine their optimal behaviors according to considerations going beyond the pure payoff maximization. These concerns lead the agents to seek for a certain distributive justice, adjusting their actions to their opponents'.

The existence of extra-material concerns in the agents' decision process has been recently revealed by experimental studies carried out on bilateral negotiation games, and, more specifically, on the Ultimatum Bargaining Game (Guth, Smittberger & Schwarze, 1982). According to the standard theory, this kind of game allowing one of the players to send a *take it or leave it* offer, should result in the capture of the whole surplus by the offerer without incurring any refusal from the responder. In the experiments, this prediction is systematically refuted even if the stake of the negotiation is worth several months of wage (Fehr & Tougavera, 1995; Slonim & Roth, 1997) or if the game institutions are modified to allow for asymmetric information or varying degrees of veto power for the responder (Guth & Huck, 1994; Croson, 1996). Hence, social motivations significantly condition the outcomes reached by players involved into a negotiation.

Even though it has been observed that social motivations may take various forms, from pure altruism (Hoffman E., Mc Cabe K.A., Smith V.L., 1996) to envy (Kirschteiger, 1994), experiments directly based on the gift-exchange game tend to show that reciprocity concerns prevail in the subjects behaviors (Fehr & al., 1993,

1996, 1998; Charness, 1998). The players are ready to sacrifice substantial amounts in order either to punish a greedy opponent or to reward a fair one according to the principle one eye for one eye.

Since reciprocity considerations seem to condition the agents' actual decisions, it seems interesting to relax the hypothesis of materialistic driven behaviors in the particular context of the employment relationship. Let's now investigate how to introduce reciprocity motivated employees and employers in the basic model of gift exchange.

## 3. Incorporating reciprocity motivated players in a sequential gift giving game.

Provided that the employer and the employees seem to act in a non-selfish way, part of the literature proposes to modify directly their utility functions to incorporate the alternative concerns ruling their behavior. If there exist a large consensus about players' motivation variety, the way one should incorporate such concerns is still debating. The bulk of the researches focus their attention on distributional concerns (Bolton & Ockenfels 1997, Fehr & Schmidt 1997, Kirchsteiger 1994). The players are motivated by their material gain and the difference between their payoff and their opponent's payoff.

Another way to cope with these fairness motives, which seems to be more accurate for our concern is to admit that employers and employees are motivated by intentions as well as by distribution. Indeed many field studies (Abowd & Allain, 1996; Bewley, 1995; Levine, 1993, 1995) highlight that *ability to pay* acts as a determinant of wage levels. In a gift giving framework this result should induce employees to be sensitive to the employer's options when choosing their effort level. If reciprocity matters, players should be sensitive to the strategy set available to their opponent when they decide to retaliate or not. Hence, if an employer has no better choice but to make a low wage offer, his behavior won't be seen as unfair as if he had denied an opportunity to give a raise.

The psychological game theory initiated by Geanakoplos, Pearce & Staccheti (1989) and developed by Rabin (1993) gives a framework to incorporate not only reciprocity concerns but also the underlying intentions in the employer and employees' utility functions. Since we are in a context where the employer first proposes a wage and the employee replies by selecting an effort level, one needs a theoretical framework defined for extensive form games. That's what propose Dufwenberg & Kirchsteiger (1998). The main purpose of such a modification in the utility functions is to introduce the retaliation and the reward as rational behaviors. A greedy proposal decreases the employee's material payoff (low wage instead of high wage) and makes her feel betrayed by the employer. However she compensates her material pain by a retaliation strategy, shirking instead of effort maximizing. Knowing that her behavior will also decrease the employer's payoff makes her better off. The psychological part of her utility compensates her material loss.

Since the players are reciprocity motivated, they care for the extent to which their opponent has been kind toward them and hence determine how kind they should be. In our sequential game, the employer (first mover) has to assess the employee's kindness to take his decision. So beliefs about kindness are to be formed. The extent to which a player is kind depends both on his own action and on his beliefs on their consequences. A reciprocity motivated second mover (employee) will therefore base her action on her beliefs on the employer's intentions. She has to make second order

beliefs, that is her own beliefs on the employer's beliefs. Hence, cooperation on strategic grounds would be regarded differently than voluntary cooperation[2].

The extent to which the two parties of the relation are fair toward each other is defined as the difference between the actual payoff one offers (or gets) and a reference allocation considered fair, which is called *equitable payoff*. It is defined as the average between the greatest and the lowest material payoff that can be given (or received) through action. If the actual payoff is equal to the equitable payoff, the player is neither kind nor unkind and then the psychological payoff doesn't influence the total utility. An employee who is proposed the fair wage doesn't feel betrayed but doesn't feel particularly favored either.

The modified utility function can be then expressed (in the space of the *efficient strategies* of the game) as the sum between the material payoffs and the psychological payoffs defined as the multiplication of the player's kindness (function) toward his opponent and his opponent's expected kindness (function) toward him.

In a two players (**i** and **j**) game, player **i**'s utility function can be expressed as follows:

$$U_i(a_i, b_{ij}, c_{iji}) = \pi_i(a_i, b_{ij}) + Y_i \kappa_{ij}(a_i, b_{ij}) \lambda_{iji}(b_{ij}, c_{iji})$$

with:

$\mathbf{a_i}$ , player **i**'s action $\in \mathbf{A_i}$ , the set of player **i**'s action.

$\mathbf{b_{ij}}$, player **i**'s belief on player **j**'s strategy, $\mathbf{b_{ij}} \in \mathbf{B_{ij}}$, the set of possible beliefs on **j**'s strategy

$\mathbf{c_{iji}}$, player **i**'s belief on player **j**'s belief on **i**'s strategy, $\mathbf{c_{iji}} \in \mathbf{C_{iji}}$, the set of possible beliefs of **i** on **j**'s beliefs on **i**'s strategy (beliefs of beliefs)

$\kappa_{ij}(a_i, b_{ij})$ corresponds to the extent to which player **i**'s action is kind toward **j**, given **i**'s beliefs on **j**'s selected behavior $\mathbf{b_{ij}}$. As stated before, $\kappa_{ij}(a_i, b_{ij})$ is given by the difference between the actual payoff **i** gives to **j** minus the equitable payoff **j** should receive, that is: $\kappa_{ij}(a_i, b_{ij}) = \pi_j(a_i, b_{ij}) - \pi_j^e(b_{ij})$

$\lambda_{iji}(b_{ij}, c_{iji})$ corresponds to **i**'s assessment of **j**'s intentions: **i**'s beliefs about **j**'s kindness. And since **j**'s kindness depends on his beliefs, $\lambda_{iji}(b_{ij}, c_{iji})$ represents **i**'s second order beliefs that is **i**'s beliefs on **j**'s beliefs on **i**'s strategy. Like $\kappa_{ij}$, $\lambda_{iji}(b_{ij}, c_{iji})$ is defined as $\lambda_{iji}(b_{ij}, c_{iji}) = \pi_i(b_{ij}, c_{iji}) - \pi_i^e(c_{iji})$.

$\mathbf{Y_i}$, represents player **i**'s intrinsic preference for reciprocity. $\mathbf{Y_i}$ is non-negative. If player **i** is selfish, $\mathbf{Y_i}$ is null. This parameter enables to introduce players' heterogeneity on the basis of the nature of their motivations as observed in the various experiments of bargaining games.

Given this modified utility function enabling us to incorporate players' reciprocity concerns, one can apply this framework to the gift giving game of wage setting[3] between the employer and the employee.

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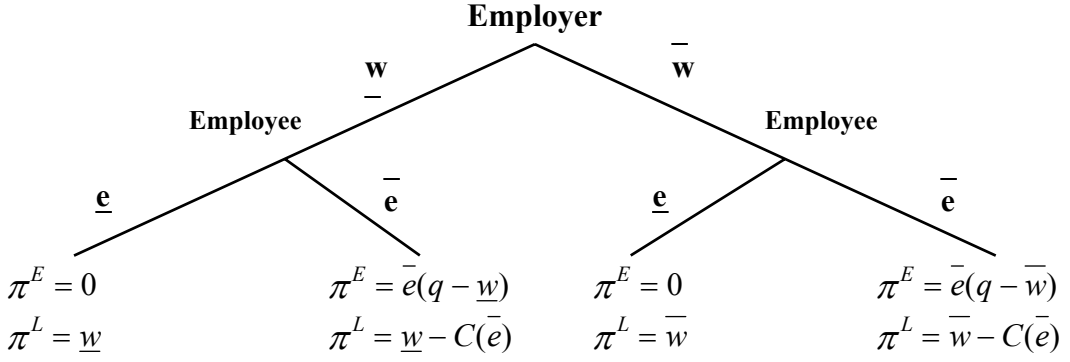
[2] Brandts & Charness (1999) observe that perceptions of intentions underlying cooperative behaviours substantially modify the outcome of the game they experiment.

[3] One must notice that this utility function is not invariant with the choice of the monetary unit because the psychological payoffs are squared as compared to the material payoffs. The theoretical model is presented with such a function only for perspicuity purposes.

## 4. The model.

We use a one shot gift exchange game whose material payoffs are inspired from Fehr,Gächter & Kirchsteiger, 1996. The employer, can either propose a high wage $\bar{w}$ or a low wage $\underline{w}$ offer being informed on his employee's profitability **q.** The employee can either respond by a high effort level $\bar{e}$ or by a low effort level $\underline{e}$. If she maximizes her effort, she incurs a cost $C(\bar{e})$ and gets $\bar{w} - C(\bar{e})$ or $\underline{w} - C(\bar{e})$ depending on the proposal. If she shirks she incurs a zero cost from effort and gets either $\bar{w}$ or $\underline{w}$. The employer gets the surplus between the profitability and the wage offer times the effort level, depending on the strategy actually selected by the employee. Let's consider the game in its extensive form:




With $\pi^E$ and $\pi^L$ being respectively the employer and employee's payoffs.

The incompleteness of the relationship lies on the inability for the employer to observe the effort level actually selected by the employee at the moment of her decision. Thus any effort level desired beyond the minimum is merely *cheap talk* from the employee's side since no mechanism ensures its enforcement. Given this framework, it is straightforward to show that the Subgame Perfect Nash equilibrium is constituted by $(\underline{w}, \underline{e})$. Indeed, if the players are only interested in their material payoffs, the employee should always shirk whatever the proposal because she eventually earns more. Since the employer expects the worker to shirk, he should propose the low wage, getting a zero payoff.

Before investigating players' behavior when reciprocity is introduced, let's make the following assumption consistent with a usual prerequisite on fairness:

*Assumption*: When the employer settles a low wage offer $\underline{w}$, the worker should always choose a low effort level in all sequential reciprocity equilibrium. Indeed, one can see that the employee earns strictly less in all circumstances when the employer gives $\underline{w}$.

Let's first investigate the employee's behavior when the employer proposes $\bar{w}$.

### 4.1. Employee's optimal behavior

The employee, facing such an offer, assesses the employer's kindness according to both the intentions underlying such an offer and whether it fits the equitability criterion as imposed by the comparison between all the possible offers. The employee then chooses the appropriate reaction that maximizes her utility.

Through her effort choice, the employee can give the employer at least 0 or at most $\bar{e}(q-\bar{w})$. The *equitable payoff* from the employer's point of view would be $\pi_E^{eq}=\frac{1}{2}\bar{e}(q-\bar{w})$. The employee's kindness toward the employer is then given by $\kappa_{LE}^{\bar{e}}=\frac{1}{2}\bar{e}(q-\bar{w})$ when she maximizes her effort, and $\kappa_{LE}^{\bar{e}}=-\frac{1}{2}\bar{e}(q-\bar{w})$ when she shirks.

In order to express the employee's utility function incorporating reciprocity concerns, one needs to give an expression to the last element of the utility function: the employee's belief on the employer's kindness toward her when he proposes $\bar{w}$. For that purpose one must know her belief on the employer's belief on her selected strategy being proposed the high wage offer. Let's call this second order belief of choosing a maximum effort $\rho$. The employee's belief on what the employer wants to give her when he proposes $\bar{w}$ depends on what strategy the worker actually selects between *shirking* and *effort maximizing*, that is ρ''( $\bar{w}$ - C($\bar{e}$)) + (1 - ρ'') $\bar{w}$[4].

The worker's belief on the employer's kindness toward her when he proposes $\bar{w}$ ($\lambda_{LEL}^{\bar{w}}$) can be expressed as the difference between the worker's belief on what the employer intends to give her minus the employee's *equitable payoff*. Since her material payoff resulting from a $\underline{w}$ proposal is $\underline{w}$ for sure, $\lambda_{LEL}^{\bar{w}}$ can be expressed as follows:

$$\lambda_{LEL}^{\bar{w}}=\frac{1}{2}\left[\bar{w}-\underline{w}-\rho''C(\bar{e})\right]$$

The expression of $\lambda_{LEL}^{\bar{w}}$ is interesting in the sense that the more the employer expects the employee to choose a high effort level, the less kind he's perceived by the employee. The gift, represented by the high wage offer looses part of its meaning if the employer is considered to be sure that it will lead to the employee's cooperation.

Therefore the employee's utility function incorporating reciprocity concerns assumes two values, depending on her effort choice:

- <u>if she maximizes her effort</u> :

$$U_L^{\bar{e}}=\bar{w}-C(\bar{e})+\frac{1}{4}Y_L\bar{e}(q-\bar{w})(\bar{w}-\underline{w}-\rho''C(\bar{e}))\,,$$

where $\mathbf{Y_L}$ represents the worker's intrinsic motivation for reciprocity.

- <u>if she shirks</u> :

$$U_L^{\bar{e}}=\bar{w}-\frac{1}{4}Y_L\bar{e}(q-\bar{w})(\bar{w}-\underline{w}-\rho''C(\bar{e}))$$

Given the modified utility function, the condition for the employee to always select a high effort level being proposed $\bar{w}$ should be such that the total utility arising from that strategy overcomes the utility of shirking, that is $U_L^{\bar{e}}>U_L^{\bar{e}}$ which yields:

$$\frac{1}{2}Y_L\bar{e}(q-\bar{w})(\bar{w}-\underline{w}-\rho''C(\bar{e}))>C(\bar{e}) \qquad (1)$$

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[4] We use double apostrophes for $\rho$ in order to differentiate between subjective and a posteriori probability.

Two cases arise from condition (1), depending on the value of the difference between the high and low wage offer that is the sign of $(\bar{w} - \underline{w} - \rho'' C(\bar{e}))$. Indeed, when $\rho''$ approaches unity this expression may turn negative if the difference between the two offers is not large enough or if the cost of effort is too important. However such a distinction is not worth being taken into account as the case where $(\bar{w} - \underline{w} - \rho'' C(\bar{e}))$ would be negative seems unrealistic in the context of the wage setting. It would mean that the difference between the two wage offers is so thin that it couldn't really be considered as a raise. We then only investigate the case where it's strictly positive.

(1) then becomes $Y_L(\bar{w} - \underline{w} - \rho'' C(\bar{e})) > \frac{2C(\bar{e})}{\bar{e}(q - \bar{w})}$ (1')

When the employer and the employee reach equilibrium, their beliefs should be fulfilled and if the worker chooses to maximize her effort (1') should hold for $\rho''$=1. The condition for the employee to cooperate implies that her motivation for reciprocity must be such that:

$Y_L > \frac{2C(\bar{e})}{\bar{e}(q - \bar{w})(\bar{w} - \underline{w} - C(\bar{e}))} = Y_L^*$>0. There's a minimum threshold on the worker's preference for reciprocity that induces her whole cooperation when offered the high wage. This result tends to confirm the idea that reciprocal fairness should act as an enforcement device for cooperative behaviors in the employment relationship to occur.

Moreover, if the employee chooses a low effort level, (1') shouldn't hold for $\rho''$=0, which happens if:

$Y_L < \frac{2C(\bar{e})}{\bar{e}(q - \bar{w})(\bar{w} - \underline{w})} = Y_L^{**}$>0. For reciprocity parameter types smaller than $Y_L^{**}$, the worker always shirks. Note that since $C(\bar{e})$ is positive, $Y_L^{**}$ is smaller than $Y_L^*$. This second result is consistent with the former one and states that the more selfish the employee the most likely she will shirk.

For intermediate parameter values between $Y_L^{**}$ and $Y_L^*$, a mixed equilibrium may exist which makes the employee indifferent between shirking and maximizing her effort, given her type, that is if $U_L^{\bar{e}} = U_L^{\underline{e}}$. Then, given the worker's preference for reciprocity, her probability to select a high effort should be such that:

$\rho = P(e = \bar{e} / w = \bar{w}) = \frac{\bar{w} - \underline{w}}{C(\bar{e})} - \frac{2}{Y_L \bar{e}(q - \bar{w})}$, with the first member of this probability representing the relative surplus induced by a high compensation and the second one making the probability depend positively on the worker's preference for reciprocity which seems natural since the employer should be considered as being kind if he proposes a high wage.

Let's summarize the employee's behavior according to her type as follows:

| | Values of $Y_L$ | | |
|---|---|---|---|
| **Wage offer** | 0 | $Y_L^{**}$ | $Y_L^{*}$ |
| $\underline{w}$ | Always shirks: $\underline{e}$ | | |
| $\overline{w}$ | $\underline{e}$ | P(e=$\bar{e}$) = $\rho$ | $\bar{e}$ |

**Figure 1 : Employee's optimal behavior according to her type**

These results are consistent with the assumption that reciprocal fairness may trigger the employee's cooperation. She maximizes her effort for sure only and only if her preference for reciprocity is large enough and with a probability positively linked to this preference when she is moderately motivated by reciprocity. However one can notice that the employee takes her decision observing the wage offer. Her lack of information lies only on her belief on the employer's intentions when offering her a high wage. It's more complicated for the employer, because he can only observe the employees' behavior ex-post. Let's show now how this lack of information from the employer's point of view may thwart possible cooperation between some reciprocity motivated employers and employees. Remind that if reciprocal fairness prevails, a reciprocity motivated employer coupled with a reciprocity motivated employee should always reach a cooperative equilibrium represented by a high wage and max effort. Let's now investigate the employer's behavior given his employee's preferences for reciprocity.

## 4.2. Employer's optimal behavior

- For $Y_L < \frac{2C(\bar{e})}{\bar{e}(q-\overline{w})(\overline{w}-\underline{w})}$, that is coupled with a greedy employee.

The employer knows for sure that the worker is mostly motivated by her material payoffs and that she will shirk whatever the offer. Since he gets a zero material payoff with certainty, he retaliates proposing $\underline{w}$. The unique equilibrium should be ($\underline{w}$, $\underline{e}$), the SPNE of the game.

- For $Y_L > \frac{2C(\bar{e})}{\bar{e}(q-\overline{w})(\overline{w}-\underline{w}-C(\bar{e}))}$, that is when coupled with an unambiguously reciprocity motivated employee.

Here the employer can expect his employee to choose $\bar{e}$ if she's proposed $\overline{w}$ and $\underline{e}$ if proposed $\underline{w}$. The outcome of the game depends on the employer's own preference for reciprocity. Since the investigation is quite similar to the case of the employee, the demonstration is left to Appendix 1 and we focus on the presentation of the conditions for a cooperative behavior to arise from the employer's point of view.

The employer's utility function is represented by:

**- if he proposes $\overline{w}$ :**

$U_E^{\overline{w}} = \pi_E(\overline{w},\bar{e}) + Y_E \kappa_{EL}^{\overline{w}} \lambda_{ELE}^{\{(\overline{w},\bar{e});(\underline{w},\underline{e})\}}$, which yields:

$$U_E^{\overline{w}} = \varepsilon''\bar{e}(q-\overline{w}) + \frac{1}{4}Y_E\left[\varepsilon''\bar{e}(q-\overline{w})(\overline{w}-\underline{w}-C(\bar{e})) - (1-\varepsilon'')\bar{e}(q-\underline{w})(\overline{w}-\underline{w}-C(\bar{e}))\right]$$

**- if he proposes $\underline{w}$ :**

$U_E^{\underline{w}} = \pi_E(\underline{w},\underline{e}) + Y_E \kappa_{EL}^{\underline{w}} \lambda_{ELE}^{\{(\overline{w},\bar{e});(\underline{w},\underline{e})\}}$, which yields:

$$U_E^{\underline{w}} = -\frac{1}{4}Y_E\left[\varepsilon''\bar{e}(q-\overline{w})(\overline{w}-\underline{w}-C(\bar{e})) - (1-\varepsilon'')\bar{e}(q-\underline{w})(\overline{w}-\underline{w}-C(\bar{e}))\right]$$

As done for the employee, let's investigate the conditions for the employer to always propose the high compensation to his reciprocity motivated employee. One needs $U_E^{\bar{w}} > U_E^{\underline{w}}$ which implies:

$$\bar{e}(q-\bar{w}) + \frac{1}{2} Y_E(\bar{w}-\underline{w}-C(\bar{e}))(\varepsilon''\bar{e}(q-\bar{w}) - (1-\varepsilon'')\bar{e}(q-\underline{w})) > 0 \qquad (3)$$

Several cases are to be emphasized in the resolution of inequality (3). Beside the investigation of the conditions for a cooperative equilibrium, the distinction based on the sign of $(\bar{w}-\underline{w}-C(\bar{e}))$ is useful to differentiate two main possible behaviors. Indeed, when $(\bar{w}-\underline{w}-C(\bar{e}))$ turns negative, the actual profit to be proposed the high wage from the employee's point of view also turns negative. Why should then be some observed cooperative behaviors of effort maximizing? It's easy to notice that such behaviors expressed by employees in that case cannot stem from strategically motivated employees but rather from actually fair ones. These kinds of employees would rather be motivated by a recognition need than by distribution. Some employees don't value the gain from a promotion as much as the status attached to the high wage offer. These fair employees reward the recognition of their profitability they have obtained through a high wage offer, even if the costs of effort implies that they would have been better off if not proposed the high wage. A classical example can be drawn from the French market of the distribution. Basic employees working in a supermarket earn a wage for a given amount of working hours a week. When they are given the opportunity to become department supervisor they access a different status without any given working time amount, which increases the cost of effort far more than the extra compensation received.

- if $(\bar{w}-\underline{w}-C(\bar{e}))>0$,

(3) becomes $Y_E > -\dfrac{2(q-\bar{w})}{\varepsilon''(q-\bar{w})(\bar{w}-\underline{w}-C(\bar{e})) - (1-\varepsilon'')(q-\underline{w})(\bar{w}-\underline{w}-C(\bar{e}))}$ (3')

When players reach equilibrium, their beliefs should be fulfilled and if the employer gives $\bar{w}$, (3') should hold for **ε''**=1. The condition for the employer to always offer the high wage implies that his motivation for reciprocity must be such that:

$Y_E > -\dfrac{2}{(\bar{w}-\underline{w}-C(\bar{e}))} = Y_E^* < 0$. This means that for the employer to propose $\bar{w}$ his preference for reciprocity should be greater than something negative, which always holds.

However, if the employer chooses $\underline{w}$, (3') shouldn't hold for **ε''**=0, that is for $Y_E$ values given by:

$$Y_E > \frac{2(q-\bar{w})}{(q-\underline{w})(\bar{w}-\underline{w}-C(\bar{e}))} = \tilde{Y}_E^{**} > 0$$

Such a result may sound counter-intuitive as this condition implies that a reciprocity motivated employer tends to refrain from proposing the high wage offer. An explanation of such a phenomenon can be found in the game structure. Contrarily to the employee, the employer has to make his choice without even observing any past behavior from the employee. At this node of the game tree, the employer is unable to draw any accurate anticipation about the nature of the employee's actual motivations. *Mutual confidence* acts as a constraint since just one party can assess intentions.

- if $(\overline{w}-\underline{w}-C(\bar{e}))<0$, (3) becomes:

$$Y_E < -\frac{2(q-\overline{w})}{\varepsilon''(q-\overline{w})(\overline{w}-\underline{w}-C(\bar{e}))-(1-\varepsilon'')(q-\underline{w})(\overline{w}-\underline{w}-C(\bar{e}))} \qquad (3'')$$

As in the case described before, when players reach equilibrium, the second order beliefs must be fulfilled which implies that when the employer selects $\overline{w}$, the condition (3'') should hold for **ε''**=1, which yields the following minimum threshold for $Y_E$:

$$Y_E < -\frac{2}{(\overline{w}-\underline{w}-C(\bar{e}))} = \widetilde{Y}_E^{*} > 0$$

and if he proposes $\underline{w}$, (3'') shouldn't hold for **ε''**=0 and then

$Y_E < \frac{2(q-\overline{w})}{(q-\underline{w})(\overline{w}-\underline{w}-C(\bar{e}))} = Y_E^{**} < 0$, never holds because $Y_E$ should be positive

For $Y_E$ values beyond $Y_E^{*} = -\frac{2}{(\overline{w}-\underline{w}-C(\bar{e}))}$, one can find a mixed equilibrium making the employer indifferent between offering a high wage or a low wage, resolving $U_E^{\overline{w}} = U_E^{\underline{w}}$ which yields:

$$\varepsilon\left[w=\overline{w}/\left\{(\overline{w},\bar{e}),(\underline{w},\underline{e})\right\}\right] = \frac{q-\underline{w}}{(q-\overline{w})+(q-\underline{w})} - \frac{2(q-\overline{w})}{Y_E(\overline{w}-\underline{w}-C(\bar{e}))(2q-\overline{w}-\underline{w})}$$

The main difference between the two cases, from the employer's point of view lies here in the fact that when $(\overline{w}-\underline{w}-C(\bar{e}))>0$, the employer's behavior implies no uncertainty, either he proposes the high wage or the low wage depending on his own preference for reciprocity compared to the theoretical threshold $\widetilde{Y}_E^{**}$. In the other case, the uncertainty is larger because only actually fair employees will reciprocate a high wage offer with an effort increase.

A third case arises when the employee is no longer clearly motivated neither by reciprocity considerations nor by pure selfishness that is when his type is $Y_L^{**} < Y_L < Y_L^{*}$. However, we don't present the demonstration here because the results go in the same way as presented in the last case. Since the employee is more ambiguously motivated by reciprocity, the area of high wage proposal is rationally smaller. We demonstrate that the employer offers the low wage so long as his preference for reciprocity is such that $Y_E > \frac{2\rho(q-\overline{w})}{(\overline{w}-\underline{w}-\rho C(\bar{e}))(q-\underline{w})} = Y_E^{**} > 0$.

The following figure summarizes the employer's optimal behavior according to his own type and the nature of the employee he's matched with.

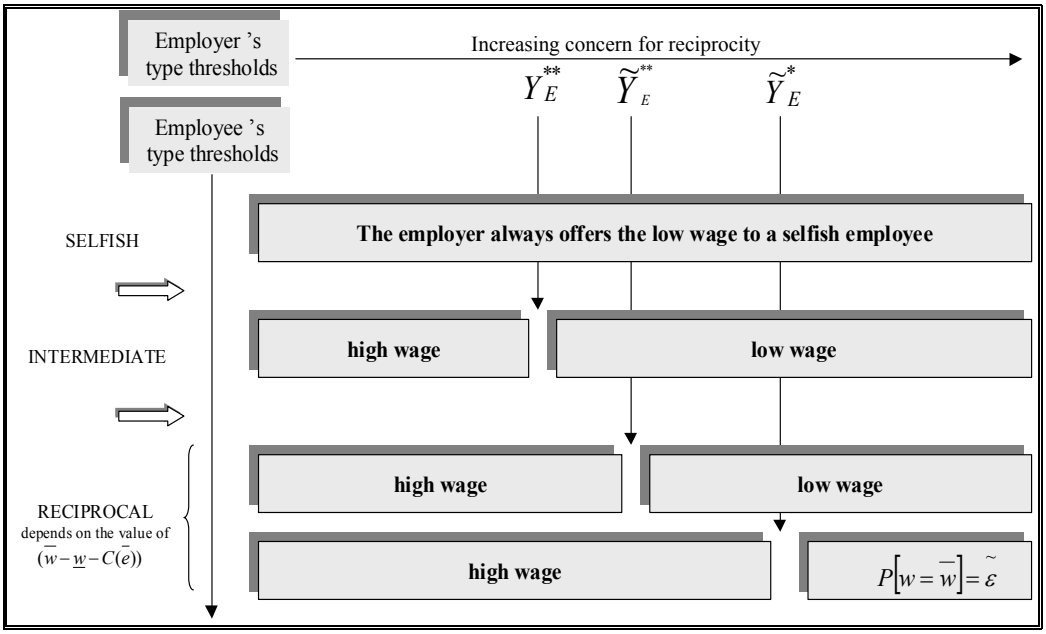


**Figure 2: Employer's optimal behavior according to his type and the employee's nature.**

Given the two players' optimal behavior structure, we can draw a typology of the possible equilibria for the game and precise the conditions for mutual cooperation to arise between the employer and the employee in this wage determination game.

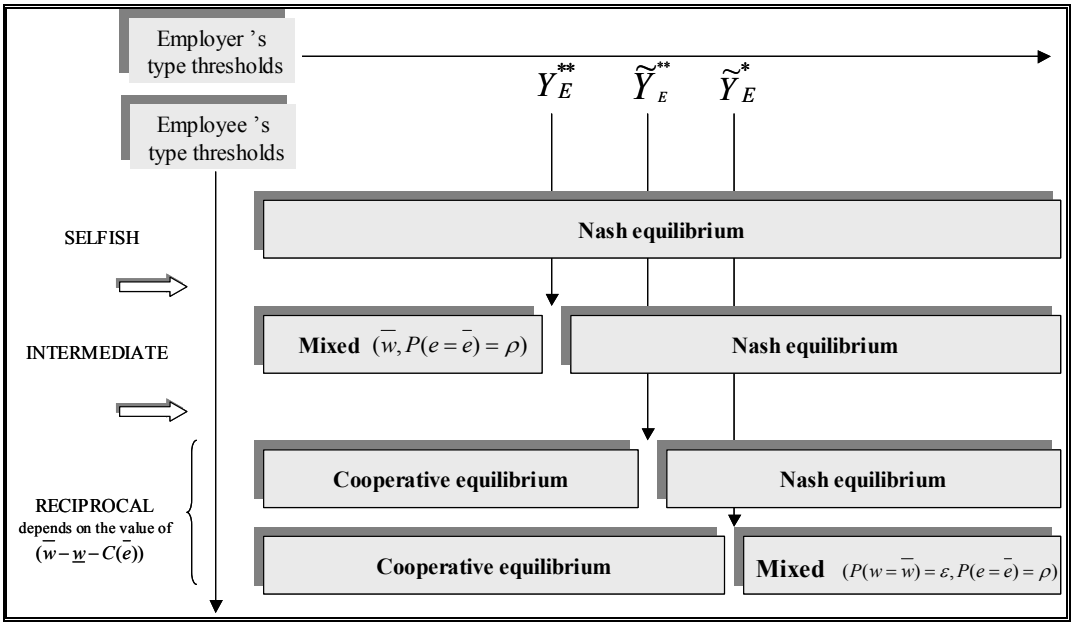


**Figure 3: theoretical equilibria of the gift exchange game**

The typology of the equilibria of the game may lead to the following observations:

*Observation 1*: Reciprocity motivations act as a necessary condition for a cooperative equilibrium to occur in this gift giving game. So long as the employee's preference for reciprocity is greater than $Y_L^*$, she acts reciprocally and the employer knows that. This first element tends to confirm the conclusion given by Fehr & al. (1996) on the reciprocal nature of the observed behaviors adopted by the subjects in their experiment.

*Observation 2:* The behaviors remain qualitatively similar whether the high wage offer implies a positive or a negative real return for the employee. Actually reciprocity motivated employees are more sensitive to the practice of the gift in itself than to the final material payoff attached to it. Fehr & al.'s (1996) observation of a positive relationship between the offered wage and the level of costly effort is then justified and may be attributed to reciprocity concerns exhibited by the employee. The model enables to show that whenever gift practices are set into a population of reciprocity motivated employees, its efficiency is guaranteed by the employees systematically maximizing their effort. However, the employee exhibits an aversion for strategic cooperation from the employer (as shown by the expression of $\lambda_{LEL}^{\overline{w}}$), especially if the real return attached to the high wage offer is low, that is if the opportunity cost of effort maximizing is rather large. This result implies that there exist arbitrations between the real return linked to the offer and the intention attributed to the employer. Therefore, there may exist an optimal value for this real return so that the employee's probability to cooperate is maximum. As a consequence, the positive relationship observed between wage and effort should reach a maximum determined by the actual gap between the two wage offers[5]. Beyond this optimal value, two elements contribute to shrink this probability. On the first hand, the greater the wage difference, the greater the employee's material payoff. The condition on the reciprocity parameter gets then more constraining. On the other hand, for employees meeting this constraint on the reciprocity parameter, their type makes them more concerned by the employer's underlying intentions. The more attractive the offer, the less likely they consider the employer as being actually fair.

*Observation 3*: Beside the employee's behavior, the theoretical results point out that the major difficulty lies in the very appearance of the gift from the employer. Indeed, there exists a wide area for non-cooperative behaviors from a reciprocity motivated employer. Such a behavior would then immediately be punished by the employee, whatever her type. It seems that the reason why the employer doesn't offer the gift lies in his misleading assessment of the employee's strategy. This leads to *self-fulfilling prophecies equilibria* endangering the employment relationship efficiency. This situation is due to the asymmetric structure of the game in terms of available information when the decisions must be made. The employee may determine the employer's fairness through the observation of his behavior whereas the employer must assess the employee's fairness without any tangible observation of her past action. The employer is founded in fearing shirking from the employee even after a $\overline{w}$ offer. Provided the optimal behavior of a selfish employer (offering systematically $\overline{w}$), the employee may then misleadingly interpret the employer's type if she receives $\overline{w}$. As a consequence, these *self-fulfilling prophecies* equilibria seem to have a strong theoretical stability since the two players are likely to stand into a trustless relationship. Since the reciprocal employer fears to be assimilated to a strategic cooperator, the virtuous circle of the gift exchange practices may fail to actually appear.

These theoretical results highlight that the nature of the reciprocity match between the employer and the employee is crucial in determining the level of cooperation that will prevail into the relationship. However, one must be aware that the model has been built so as to make the non-cooperative outcome the most attractive equilibrium

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[5] Simulations of this same model in Mahuteau (2000) show that there actually exists optimal values for the level of the wage raise the employer should grant the employee for him to maximize the probability of mutual cooperation.

for the players. Beside that we can observe that stable gift exchange practices may arise between the employer and the employee, as long as the reciprocity threshold for the employer, which conditions the appearance of self-fulfilling prophecies equilibrium, remains high enough. As suggested by Falk and Gachter (1998), the long-term nature of the employment relationship may well alter the occurrence of such non-cooperative behaviors.

We now aim at testing the predictions of our model, directly estimating the determinants of gift exchange practices in the French context. Can we attribute to reciprocity concerns, the employers' choices to set up rent-sharing agreements and the employees' decisions to increase their level of effort?

# 5. Estimation of the gift exchange hypothesis in the French context.

## 5.1. Database and structure of the estimations

Our estimations are based on the REPONSE 98. The REPONSE database stems from a survey directed by the DARES (Direction de l'Animation de la Recherche, des Etudes et des Statistiques; Ministère de l'Emploi et de la Solidarité) which gathers data on 3000 firms of any size (from 20 to 17000 employees) and any sectors except agriculture and public sectors. The data stem from two questionnaires: the first one for the employers who answer the questions through direct interviews, and the second one for the employees, 5 to 10% of whom are randomly drawn to answer a written document. 10304 employees have sent the questionnaire back. Data obtained both on the employer and employee's side and the subjective nature of some questions asked to them make this database particularly fruitful for evaluating the impact of the reciprocity considerations in the employment relationship. Moreover, questions related to themes like motivation, negotiation and conflicts are common between the employer and the employee. The survey also supplies variables in order to control the effects related to the size, sector, capital structure, and to the kind of manpower used in the firm. Report to Appendixes 3 to 5 for descriptive statistics of the variables of the database used in the estimations.

Given the database, we propose a direct evaluation of the gift exchange practices between the employer and the employee, estimating the probabilities to observe productivity increases following upon the settlement of rent-sharing agreements in the firm.

Since the agents interpret the other's actions through the prism of their social motivations, costly reward behaviors may be rationally adopted by employers and employees. Indeed, the theory implies that the agents found their behavior on arbitrations between material payoffs and psychological gains, which outcome depends on their level of motivation for reciprocity. Moreover, their behaviors are supposed to be direct reactions to their perception of their opponent's kindness. On a practical point of view, this latter characteristic involves that the estimation should entail an endogeneity bias related to the perception of fairness. If any agent has his own preference for reciprocity leading him to behave differently according to his perception of the other's kindness, the hypothesis stating that the individuals are randomly drawn from the population is not satisfactory for the estimations of the probabilities. This leads to incorporate the agents' beliefs on the other party's kindness in the estimation of the probabilities to both offer rent-sharing agreements and increase the level of productivity in response. Since no variables related to beliefs are available in the database, the perception of the social climate (available for both

agent) will be considered as a proxy describing how the agents feel toward each other (variable CLIMATE).

The correction of the potential endogeneity bias related to the perception of the other's level of fairness implies that one should estimate this perception and incorporate the estimated probabilities into respectively the estimation of the probability to offer rent-sharing agreements for the employer and the probability to respond by an effort increase for the employee. However, the theoretical model states that the employee's decision to raise her productivity occurs after the employer's choice, that is after her observing the employer offering rent-sharing agreements. Thus, it is not the belief on the employer's kindness that should be incorporated in the employee's case but her actual observation. More precisely, the influence of the variable CLIMATE will enable to assess the behavioral consequences of the observation by the employee of the employer's kindness (instead of incorporating the employee's estimated probability). The structure of the estimations is then explained by the asymmetry between the two agents due to the sequential nature of the decision process.

For the econometric results to be compatibles with the theoretical model, they must highlight both the agents' sensitivity to the other's level of kindness (anticipated or observed) and a positive relationship between the gift practice and the productivity raise.

Technically, the structure of the estimations is summarized in Figure 4. We use a three step method in order to estimate the model.

Proving the existence of an endogeneity bias due the agents' perception of their opponent's level of fairness, enable to show that the agents evaluate the other's degree of fairness but also that this evaluation actually provokes reactions from them. If the perception of the employee's assessed degree of fairness actually determines the employer's choice to propose rent-sharing agreements, the probability for the employer to actually set up such agreements can be described by the following model:

$$Gift_i^* = \gamma' Z_i + \alpha\, pemplc_i + \varepsilon_i, \text{ with } \begin{cases} Gift_i = 1 \text{ if } Gift_i^* > 0 \\ Gift_i = 0 \text{ if } Gift_i^* \leq 0 \end{cases}$$

$$Pemplc_i^* = \xi' R_i + \upsilon_i, \text{ with } \begin{cases} Pemplc_i = 1 \text{ if } Pemplc_i^* > 0 \\ Pemplc_i = 0 \text{ if } Pemplc_i^* \leq 0 \end{cases}$$

$Gift_i$ represents the probability for the employer to offer the rent-sharing agreement. $Pemplc_i$ is a dichotomic variable indicating the employer's perception of a favorable social climate in the firm. $\varepsilon_i$ is the error term. The influence of his perception of the employee's degree of fairness is measured by $\alpha$. $R_i$ represents the set of the individual exogenous characteristics determining the employer's perception of the employee's fairness. $\upsilon_i$ is the error term associated to the estimation of this equation. If an endogeneity bias exists, it stems from an unobservable characteristic of the employer since it is related to his intrinsic motivation for reciprocity. Technically, the model described above involves that $E[R_i \varepsilon_i] = 0$ but also that $E[\upsilon_i \varepsilon_i] \neq 0$ [6]. A

[6] An endogeneity bias stemming from observable factors would involve $E[R_i \varepsilon_i] \neq 0$, with $E[\upsilon_i \varepsilon_i] = 0$. In this case, the correction is simpler as it only consists in incorporating the variables $R_i$ directly in the equation (Cf Barbow, Cain & Goldberger, 1980). This latter method is used for the case of the employee as she bases her perception of fairness on an observation.

method for correcting this potential endogeneity bias consists in estimating the probability for the employer to perceive a favorable social climate (proxy of his perception of the employee's kindness), using a binomial Probit model and use the estimated probability vector as instrument to evaluate the probability for the employer to propose rent sharing agreements. The equation to be estimated in the second step would then be:

$Gift_i^* = \gamma' Z_i + \alpha \widehat{pemplc}_i + \varepsilon_i$, with $\widehat{pemplc}_i^* = \hat{\xi}' R_i$, the probability estimated at the first step.

Once the second step achieved, one needs to estimate the probability for the employee to increase her effort after being proposed rent-sharing agreements. One then estimates the following model:

$$produc^* = X\beta + \vartheta, \text{ with } \begin{cases} produc = 1 \text{ if } produc^* > 0 \\ produc = 0 \text{ if } produc^* \leq 0 \end{cases}$$

The dichotomic variable *PRODUC* (productivity increases or not) is unobservable if the employer hasn't introduced the rent sharing agreement. Yet, since the employer and the employees belong to the same firm, it is likely that their respective decision rely on common determinants. Thus, one needs to correct the selection bias potentially caused by the focus of the analysis on the only category of employees who benefited from the introduction of profit sharing.

A two-stage method, analogous to the one developed by Heckman (1979) is necessary. This method takes the non-linear nature of the estimation into account. We first estimate the probability for the rent-sharing scheme to be adopted:

$$Gift^* = D\gamma + \varepsilon, \text{ with } \begin{cases} Gift = 1 \text{ if } Gift^* > 0 \\ Gift = 0 \text{ if } Gift^* \leq 0 \end{cases} \text{ and with } D \text{ incorporating } Z \text{ and } \widehat{pemplc}$$

We then focus on the probability for the employees to return the gift by a productivity increase, that is $P(produc = 1 / Gift = 1) = P(produc / \varepsilon < D\gamma)$.

$\vartheta$ and $\varepsilon$ are not independent since employer and employees' behavior may be caused by common elements. If we assume that $\vartheta$ and $\varepsilon$ are distributed according to a bivariate normal distribution with $\rho$ as correlation coefficient, then the expected value of the error term $\vartheta$, provided that the employer has introduced the profit sharing scheme, can be defined by: $E(\vartheta / \varepsilon < D\gamma) = \rho\lambda$, with $\lambda$ inverse of the Mill's ratio obtained in the selection equation, $\lambda = -\dfrac{\varphi(D\gamma)}{\Phi(D\gamma)}$. The λ vector must then be incorporated as explanatory variable in the estimation of the probability to observe productivity raises in order to ensure $E(\tilde{\vartheta} / \varepsilon < D\gamma) = 0$. However the introduction of the inverse of the Mill's ratio in the second equation doesn't allow obtaining a non-biased estimation of the coefficients $\beta$. A correction must be added in order to take the latent characteristic of the dependent variable (*Produc**) into account, as we can't observe all the realizations of this random event [7].

If the second equation is estimated directly:

$produc^* = X\beta + \rho\lambda + \tilde{\vartheta}$

We have $E(\tilde{\vartheta} / \varepsilon < D\gamma) = 0$, but also $Var(\tilde{\vartheta} / \varepsilon < D\gamma) = 1 - \rho^2\lambda(D\gamma - \lambda) = \tau^2$. Thus a consistent estimation of $\beta$ and $\rho$ implies that we render $Var(\tilde{\vartheta} / \varepsilon < D\gamma)$

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[7] Through the observation of *Produc,* we only observe whether *Produc**>0 or *Produc**ſ0.

constant. The method then consists in dividing the equation by $\tau$. The following model enables to get a consistent estimation:

$$produc = 1 \text{ if } \left(\frac{X}{\hat{\tau}}\right)\beta + \rho\left(\frac{\hat{\lambda}}{\hat{\tau}}\right) + \vartheta > 0$$

$$produc = 0 \text{ if } \left(\frac{X}{\hat{\tau}}\right)\beta + \rho\left(\frac{\hat{\lambda}}{\hat{\tau}}\right) + \vartheta \leq 0$$

with $E(\vartheta / \varepsilon < D\gamma) = 0$ and $Var(\vartheta / \varepsilon < D\gamma) = 1$. $\hat{\lambda}$ is a consistent estimator of $\lambda$ stemming from the estimation of the selection probit. $\hat{\tau}$ is computed through the consistent estimation of $\rho$, $\hat{\rho}$ stemming from the estimation of the final equation by OLS .

**Step 1: Determinants of the employer's perception of the employee's expected fairness**

**Dependent variable** CLIMATE

*Binomial Probit model:*

$$Pemplc_i^* = \xi' R_i + \upsilon_i$$

*Do you reckon the social climate has been good in the firm for the past 3 years?*

**Yes** **No**

We keep the estimated probability: PEMPLC, and incorporate it as explanatory variable in step 2

**Step 2: selection equation: Probability to adopt profit sharing agreements**

Evaluation of the determinants of the gift practice from the employer:

**Dependent variable:** INTERE

- Incorporation of the employer's perception of the employee's kindness (variable PEMPLC) in $Z$

*Binomial Probit model:*

From this equation we keep the Mills ratio in order to correct the selection bias in the second equation:

$\lambda = -\frac{\varphi(Z\gamma)}{\Phi(Z\gamma)}$, Mill's ratio.

*In 1998, the employees benefited from a general agreement introducing profit sharing in their compensation*

**Yes** **No**

$Gift_i^* = \gamma' Z_i + \alpha \hat{pemplc}_i + \varepsilon_i$, where $\varepsilon \rightarrow N(0,1)$

**Step 3: Estimation of the probability of productivity raise in return of the gift.**

**Dependent variable:** PRODUC

*Did the agreement on the compensation scheme yielded productivity raises from the employees ?*

**Yes** **No**

- Binomial probit model with the correction of the selection bias adapted to the latent nature of the dependent variable in the second stage.
- Incorporation of the employee's observation of the employer's kindness (variable CLIMATE) in $X$

Estimated equation: $produc^* = X\beta + \rho\lambda + \tilde{\mu}$

Provided that:

$$E(\tilde{\mu} / \varepsilon < Z\gamma) = 0 \text{ et } V(\tilde{\mu} / \varepsilon < Z\gamma) = 1 - \rho^2 \lambda(Z\gamma - \lambda) = \tau^2$$

Consistent estimation of $\beta$ and $\rho$ after correcting the variables by $\tau$.

**Figure 4: Structure of the estimations of the gift exchange practices**.

## 5.2. *Determinants of the employer's perception of teh employee's degree of fairness.*

The results of the estimations of the employer's perception of the employee's degree of fairness are reported in Appendix 2. They show that the size of the firm negatively influences the employer's perception. The size effect leads to a partial loss of control and observation of the employees' actions, favoring, from the employer's point of view, the adoption of non-cooperative behaviors. Likewise, the age of the firm alters the perception of the social climate. Several explanations can be proposed.

On the first hand, age and nature of the activity are related toward a more services and high technology oriented activity for the most recent firms. Even if this relation is not systematic, the composition of the manpower qualitatively varies according to the age, highlighting a certain evolution of the firms' activities. The most recent firms are composed, in average, by more white collars than workers whereas the workers are a majority in the more ancient firms. We can then assume that the more ancient firms are more likely to be manufacturing firms. Provided the recent restructuring observed in the industry, we can suppose that the climate is more conflicting.

On the other hand, the age of the firm implies that the behavioral or compensation norms have been established for long. The employer's ability to enforce any change in the human resource management is then narrowed. The results reveal that the effect *composition of the manpower* incorporated into the variable "age of the firm" should be distinguished from the evolution of the actual composition of the manpower (variables EVCOUVR and EVCADR). The coefficients associated to these latter variables show that a recent increase of the number of workers hired doesn't degrade the employer's perception of the social climate. Consequently, we can say that it is not a particular category of employees that alters the perception but rather the duration of the relationship with these various categories.

The variables related to the economic conjuncture faced by the firm (CROISS, STABLE, VARIAT) show that the stability or increase of the volume of activity improve the perception while unexpected changes produce the reverse effect. Likewise, the adoption of a *total quality* policy (QUALTOT) leads to a better perception of the social climate.

Through the variables PRIMI and PRIMCO, one can see that the employer believes in the potential positive effect of the introduction of individualized premiums.

Concerning the variables related to the beliefs of what determines the employee's motivation, the employer reckons that the lack of recognition is damaging for the perception of the social climate. The negative sign obtained for NCMANREC shows that the employer's perception of the employee's kindness is degraded when the non-white collars suffer from a lack of recognition inside the firm.

Given the estimated probabilities for the employer, we now have to demonstrate that these perceptions lead to actual behavioral consequences and are susceptible to alter the employer's decision to offer rent-sharing agreements.

## 5.3. *Probability to offer rent-sharing agreements.*

We seek for the elements determining the choice to introduce profit sharing elements in the employee's remuneration package. This decision is taken according to the objective and subjective elements at the employer's disposal. The explanatory variables then stem from the employer's database. We introduce the characteristics of the firm, its economic environment, variables related to the human resource management practices in use and the subjective variables related to the employer's belief on the employees' kindness and on the determinants of their motivation. The two following tables present the results obtained for the selection equation.

| Binomial **PROBIT** model:<br>Dependent variable: **INTERE**, "In 1998, you adopted a general agreement introducing profit sharing in the remuneration package ".<br>Estimation by Maximum likelihood. | |
|---|---|
| Number of observations: | 1546 |
| Log Likelihood (Log L): | -883,5009 |
| Restricted Log Likelihood (Log $L_R$): | -1067,399 |
| Pseudo $R^2$: | 17,23% |
| Percentage of correctly predicted variables | 69,922% |
| Degrees of freedom | 23 |
| LR test statistic (restricted vs. Non restricted model) | 367,07954 |
| Significance | 0,0000000 |
| Log Likelihood with heteroskedasticity correction | -848,8441 |
| $LR_H$ test statistic | 69,3136 |
| Significance | 0,0000016 |
| LM test statistic | 415,9474 |
| Significance | 0,0000000 |
| **Model without anticipation of the employee's kindness against model with anticipation:** | |
| Log Likelihood (without PEMPLC) | -892.3389 |
| $\chi^2(22)$ statistic | 17.676 |
| Significance | 0,77481894 |

| | Variable | Designation | Coef | Std | T | P[\|Z\|>z] |
|---|---|---|---|---|---|---|
| | ONE | *Constant* | **-3,1204**$^{***}$ | 0,505 | -6,185 | **0,0000** |
| Variable related to the economic environment and characteristics of the firm | PRIVE | *The firm belongs to the private sector* | **0,4565**$^{***}$ | 0,169 | 2,708 | **0,0068** |
| | FEMMES | *Percentage of women in the firm* | **-0,0023**$^{*}$ | 0,001 | -1,674 | **0,0941** |
| | LOGSALET | *Logarithm of the number of employees in the firm* | **0,0971**$^{**}$ | 0,038 | 2,534 | **0,0113** |
| | LOGAGE | *Logarithm of the age of the firm* | **0,1645**$^{**}$ | 0,081 | 2,024 | **0,0429** |
| | MULTI | *The firm has multiple firms* | **0,1961**$^{***}$ | 0,072 | 2,732 | **0,0063** |
| | SOUTRAI | *During the past 3 years, you greatly developed subcontracting and externalization: 1 for: yes* | **0,3470**$^{***}$ | 0,082 | 4,209 | **0,0000** |
| | QUALTOT | *The firm has adopted a total quality policy.* | **0,1408**$^{*}$ | 0,076 | 1,850 | **0,0643** |
| | CLIENT | *In 1998, the main client represented at least 25% of the firm's activity: 1 for: yes.* | **-0,1088**$^{ns}$ | 0,074 | -1,479 | **0,1392** |
| | STRATPRI | *In order to compete with the other firms did you set a strategy based on price competition for your main activity? 1 for: yes* | **0,1593**$^{*}$ | 0,086 | 1,857 | **0,0633** |
| | DIFRECR | *In 1998, The employer had difficulties to hire some categories of employees: 1 for: yes.* | **-0,2068**$^{***}$ | 0,073 | -2,841 | **0,0045** |
| | EVCOUVR | *During the last 3 years, the number of workers has increased: 1 for: yes* | **-0,0924**$^{ns}$ | 0,088 | -1,045 | **0,2960** |
| Compensation policies inside the firm | OBJCOUT | *In 1998, precise and quantified goals have been drawn in terms of wage costs: 1 for: yes* | **0,2055**$^{**}$ | 0,095 | 2,155 | **0,0312** |
| | RESFI | *Your main criteria to decide for wage raises is the financial result of the firm : 1 for: yes* | **0,2603**$^{***}$ | 0,102 | 2,544 | **0,0110** |
| | PRIMI | *In 1998, all the employees benefited from premiums related to their individual performance 1 for: yes* | **0,2427**$^{***}$ | 0,083 | 2,936 | **0,0033** |
| | PRIMCO | *In 1998, all the employees benefited from premiums related to collective performance: 1 for yes* | **0,6085**$^{***}$ | 0,072 | 8,429 | **0,0000** |
| | NAUGMI | *In 1998, the blue collars benefited from individualized raises others than premiums: 1 for: yes* | **0,1699**$^{*}$ | 0,089 | 1,909 | **0,0562** |
| Belief on the employee's kindness | INDPROD | *The employer considers the productivity level as the main criteria to judge the social climate in the firm: 1 for: yes* | **-0,2118**$^{*}$ | 0,128 | -1,658 | **0,0973** |
| | PEMPLC | *Employer's estimated probability: Probability to perceive a good social climate.* | **0,7813**$^{*}$ | 0,447 | 1,746 | **0,0808** |
| Determinants of the employee's motivation | NCESPROM | *It's the hope of getting promoted that determines the implication of the blue collars in their work: 1 for: yes* | **0,2635**$^{**}$ | 0,114 | 2,304 | **0,0212** |
| | NCMANREC | *It's the lack of recognition that demobilizes the blue collars: 1 for: yes.* | **0,1249**$^{ns}$ | 0,102 | 1,220 | **0,2225** |
| Variables of information and negotiation | EVEMP | *Information on the evolution of the employment perspectives are given to the employees of the firm* | **0,1813**$^{**}$ | 0,074 | 2,446 | **0,0144** |
| | NEGSL99 | *In 1998, there's been a negotiation with the representatives about the wage level: 1 for: yes* | **0,3385**$^{***}$ | 0,083 | 4,093 | **0,0000** |
| | HSUP | *During the 3 last years, there's been a conflict taking the form of extra hours refusals: 1 for: yes* | **-0,3261**$^{*}$ | 0,176 | -1,854 | **0,0638** |

**Table 1: estimation of the probability to introduce profit sharing agreements**

The results show that the employer's belief on the employee's kindness greatly influences his probability to offer profit sharing agreements. Indeed, the test of the restricted model without the perception (without PEMPLC) against the model incorporating this variable gives a large superiority to the latter. One can notice that the coefficient associated to this belief is positive, confirming that the more the employee is considered fair, the more likely the profit sharing agreement is adopted. Accordingly to our assumptions this result enables to conclude that the perception of the employee's kindness plays a major role in the employer's decision to set up a profit sharing scheme.

The results show that the economic environment faced by the firm as well as the wage policies already in use greatly influence his decision.

The age and size of the firm favor the adoption of the profit sharing. This kind of incentive schemes is more typical from large firms since this kind of agreement (at least in France) are meant to restore equity among the employees in terms of

participation to the firm's growth. Beside the gift practice in itself, adopting an agreement on profit sharing is also a mean for the employer to signal and ensure transparency in the gift practice. This is a non-negligible aspect since the employees are generally perfectly informed on their colleagues' earnings[8] and might develop an aversion not to be evenly treated as compared to the other members of their group[9]. The introduction of a profit sharing scheme stemming from a negotiation enables to avoid the potential troubles linked to a less formal gift practice (perception of favoritism, etc…). These side effects would be exacerbated in the context of older and larger firms where many different categories of employees, in terms of age and qualification, interact. The effect of the variable MULTI relies on the same principle.

Moreover, if the firm has greatly externalized some of her activities through subcontracting, the profit sharing is more likely to be adopted. Here, the willingness to focus on the core activities yielding the more added value for the firm may be accompanied by a concern for conserving the skills and know-how needed for these activities. The coefficient obtained for QUALTOT confirms this idea. On the contrary, if the firm develops some exclusive relations with one unique client (the variable CLIENT may be considered as indicating that the firm is more like a subcontractor for this client), the probability to adopt profit sharing is reduced. In that case, we can imagine that the firm tries to cut the costs in order to provide the most competitive possible service in order to remain in business with this main client.

The coefficient obtained for DIFRECR is relatively counter-intuitive since it seems to show that difficulties for recruiting some employees incurred by the firm leads to a smaller probability to propose the profit sharing. It seems more accurate to invert the causality in this case, assuming that it is because no profit sharing scheme has been adopted that the firm had difficulties to hire some categories of personnel. However, nothing in the estimations enables to favor one causality more than the other.

Given the results obtained for the variables related to the wage policies already in use in the firm, it seems that the rent sharing can be considered as representing a more achieved form of gift. Even if the variable RESFI recalls that the employer remains concerned about the financial results of the firm before proposing such agreements, the variables PRIMCO and NAUGMI show that if the firm has previously tested these schemes, the probability to adopt rent-sharing is increased. This result seems to highlight that rent-sharing appears after having tested the efficiency of various, less formal, incentive policies on the employees' motivation. The collective agreements on the adoption of the rent sharing generally stem from a negotiation starting with the employees' claim to define a formal, more equitable framework for the collective premiums. Therefore, it is not contradictory to have both rent-sharing practices and the definition of precise and quantified goals in terms of labor costs (variable OBJCOUT).

Furthermore, rent-sharing practices are not incompatible with the existence of individualized premium policies. On the contrary if the latter already exists, the probability is increased. The two schemes are complementary in the sense that, being inciting, they limit the variance of the remuneration. A too large heterogeneity of the earnings might create some tensions between employees, some of them feeling unfairly treated.

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[8] For instance, Krueger and Rouse, in a study carried out on the manufacturing sector, notice that the employee are fully aware of their colleagues compensation. They are able to estimate it with an average error of 21%.

[9] In the definition of the equity norm we can suppose that some horizontal comparisons among employees also exist.

In his decision, the employer incorporates his belief on the determinants of the employee's motivation in her work. The coefficients associated to NCESPROM and NCMANREC indicate that the employer may find in the rent sharing a solution to the employees' recognition need, especially for the blue collars. The fact that these variables are not significant for the others categories of personnel clearly shows that the employer takes into account the employee's heterogeneity in terms of the determinants of their motivation.

The results highlight that the probability to adopt rent sharing also depends on the variables related to the previous negotiations and conflict that occurred in the firm. The existence of previous negotiations on the wage level favors the choice to propose rent-sharing agreements. But if the employees have refused to do extra hours, the employer may doubt of the positive effect of the rent-sharing on the level of productivity (the coefficient of HSUP is negative).

The estimation then enables to corroborate the assumption that the anticipation of the employee's kindness greatly determines the adoption of rent sharing. Moreover, this form of gift is used in addition to other incentives, there's no arbitration between collective and individual policies.

## 5.4. *Does the rent sharing lead to productivity increases ?*

Which are the determinants of the productivity increase provided that the employer has set up a profit sharing policy? For the theoretical model to be corroborated, the productivity gains must be a direct consequence of the gift practice from the employer. Moreover, the variable related to the observation of the employer's kindness by the employee must be significant and have a positive coefficient. At these conditions, we can demonstrate that the productivity increases constitute an actual reaction to the employer's action and are motivated by reciprocity considerations.

| Binomial **PROBIT** model:<br>Dependent variable : **PRODUC**, "Have you observed productivity increases after the introduction of profit sharing?".<br>Estimation by Maximum Likelihood | |
|---|---|
| Number of observations | 1460 |
| Log Likelihood (Log L) | -447,0704 |
| Restricted Log Likelihood (Log $L_R$) | -703,4622 |
| Pseudo $R^2$ | 36,45% |
| Percentage of correctly predicted variables | 82,05% |
| Degrees of freedom | 16 |
| LR test statistic (restricted model against non restricted model) | 512,7837 |
| Significance | 0,0000000 |
| Log Likelihood with heteroskedasticity correction | -428,0263 |
| $LR_H$ test statistic | 38,0882 |
| Significance | 0,0014701 |
| LM test statistic | 960,9313 |
| Significance | 0,0000000 |

| | VARIABLE | Designation | Coef | Std | t | P[\|Z\|>z] |
|---|---|---|---|---|---|---|
| | ONE | *Constant* | **-5,5982**$^{***}$ | 0,761 | -7,359 | **0,0000** |
| | CDON | *Inverse of the Mill's ratio* | **2,7138**$^{***}$ | 0,320 | 8,476 | **0,0000** |
| Individual characteristics | CLOGMWAG | *Logarithm of the employee's age (mean of the employees in the firm)* | **0,2566**$^{ns}$ | 0,419 | 0,612 | **0,5405** |
| | CDIPLO | *Highest diploma:<br>1 for: autodidact,<br>2 for: certificat d'études,<br>3 for: BEPC (TAFE)<br>4 for: CAP- BEP (TAFE, higher level)<br>5 for: Baccalauréat,(HSC)<br>6 for: Bac +2 (undergraduate)<br>7 for: Bac +3 ou +4(Bachelor or Masters)<br>8 for: supérieur à Bac +4 (Honours and more)* | **0,0264**$^{ns}$ | 0,056 | 0,469 | **0,6389** |
| | CFEMMES | *Percentage of women in the firm* | **-0,0019**$^{ns}$ | 0,002 | -0,886 | **0,3754** |
| | CSTRATP | *In order to compete with the other firms did you set a strategy based on price competition for your main activity? 1 for: yes* | **0,2577**$^{**}$ | 0,124 | 2,078 | **0,0377** |
| Variables of information diffusion inside the firm | CECOENT | *Information about the economic situation of the firm is directly given to the employees* | **0,5439**$^{***}$ | 0,173 | 3,141 | **0,0017** |
| | CEVEMP | *Information on the evolution of the employment perspectives are given to the employees of the firm* | **0,3975**$^{***}$ | 0,139 | 2,858 | **0,0043** |
| | CFORMPR | *Information on the possibilities of training in the firm are given to the employees* | **-0,2760**$^{**}$ | 0,114 | -2,416 | **0,0157** |
| Variables related to compensation | CLOGPRIM | *Logarithm of the annual premiums received by the employee* | **0,0023**$^{ns}$ | 0,030 | 0,077 | **0,9389** |
| | CLOGSALAI | *Logarithm of the annual wage* | **0,2246**$^{ns}$ | 0,192 | 1,171 | **0,2418** |
| | CMWNEG98 | *In 1998, there's been a negotiation with the representatives about the wages: 1 for: yes* | **0,1548**$^{ns}$ | 0,147 | 1,057 | **0,2907** |
| Employer's fairness | CMWCLIMAT | *The employee considers the social climate as good: 1 for: yes* | **0,2808**$^{**}$ | 0,120 | 2,334 | **0,0196** |
| Variables related to the determinants of motivation | CMWGAMB | *It's the work atmosphere that demobilizes the employee: 1 for: yes* | **-1,0443**$^{*}$ | 0,606 | -1,725 | **0,0846** |
| | CMWGAUTO | *It's the lack of autonomy that demobilizes the employee: 1 for: yes* | **-0,9788**$^{ns}$ | 0,673 | -1,454 | **0,1459** |
| | CMWPROM | *It's the hope of being promoted that conditions the employee's implication in her work: 1 for: yes* | **0,7847**$^{***}$ | 0,265 | 2,962 | **0,0031** |
| | CMWRISK | *Subjective risk to be laid off:<br>1 for: the employee thinks he has a great chance to be laid off in the near future.<br>0 for: otherwise.* | **-0,3198** | 0,201 | -1,590 | **0,1119** |

*(The variables are corrected by $\tau$ in order to obtain consistent estimations)*
*(Every variable with a W in its name have been informed by the average employee of the firm)*

**Table 2 : Estimation of the probability to obtain productivity increases after setting up rent-sharing agreements.**

The major result of this estimation is that individual characteristics and compensation variables don't influence the probability to observe productivity increases following the gift practice. Thus, it is impossible to identify either a particular category of employee, a type of job, a diploma level or even an age category more likely to increase the productivity level facing the implementation of rent-sharing agreements. Moreover, the fact that the annual premiums and wages received don't influence the probability shows that the employees only superficially integrate material considerations (in terms of volume) into their decision to increase their productivity. These variables exert an indirect influence, through the perception

of the social climate in the firm. The decision to increase productivity is mainly determined by a reaction toward the employer's very choice to introduce rent-sharing agreements, which is compatible with the theoretical model.

The coefficient obtained for the inverse of the Mill's ratio confirms that it is the employer's choice to offer the rent sharing that conditions the employee's decision to raise her productivity. At the same time, the employee makes sure the employer behaves fairly (CMWCLIMAT). In the theoretical model, the employee's decision to maximize her effort in response to the gift practice is determined by her belief on the more or less strategic concerns driving the employer in his decisions. If the employee thinks that the employer expects her cooperation for sure, his offer may be considered as strategic and may induce the exact contrary outcome as expected. The results obtained for CMWCLIMAT and CDON corroborates this assumption. Moreover, it seems that the positive relation observed between rent sharing practices and productivity gains is strengthened by a *commitment effect*, as already observed in Fehr & al. (1997, 1998). Indeed, rent-sharing agreements incorporate elements that we can relate to the so-called *desired effort level*. The signature of such agreements by the two agents leads the employee to tend toward this desired effort level by self-commitment.

Thus, it seems that reciprocity consideration are strong enough to induce costly reward actions from the employees in return to the gift offered by the employer.

The variables related to the non-material determinants of the employee's implication in her work enable to account for the behavioral consequences of the employees' heterogeneity in terms of motivation, i.e. of their type. The employee who bases her motivation on a sought for promotions intrinsically incorporates, in her arbitration, the positive relation between wage and effort. Even though the rent sharing is based on collective performances, it produces enough incentives for that kind of employee as shown by the coefficient of CMWPROM. However, the fact that some other variables related to the employee's motivation are not significant involves that the rent-sharing doesn't represent an adequate response for some kind of employees to have them raise their productivity. For example, those who found their implication on a recognition need might be frustrated by the collective aspect of this incentive scheme. Likewise, those who suffer from too much pressure on the workplace or from a lack of autonomy seem to be indifferent to that kind of measure (variables CMWGAMB and CMWGAUTO ).

## 6. Conclusion

The direct estimations of gift exchange practices in the employment relationship leave room for the expression of reciprocity concerns exhibited by both the employer and the employee as suggested by the theoretical model. These concerns appear to be strong enough to produce behavioral consequences compatible with the agent's perception of how fair they are being treated in the firm. Indeed, the employer is more likely to decide to set up rent-sharing agreements if his belief on the employee's kindness is favorable and the employee also determines her decision to cooperate according to her observation of the employer's kindness. Thus the central assumption of the theoretical model stating that reciprocity considerations would be the catalyst of the agents' cooperation in the employment relationship is corroborated by the estimations on the REPONSE 98 survey. The observed positive relationship between rent-sharing and productivity raises can actually be attributed to the reciprocity considerations exhibited by the agents. This gives evidence that it is the deviation (positive or negative) from the norm considered as being fair that conditions the reactions and not the level of compensation itself. The hypothesis earlier made by

Akerlof and Yellen stating that employers and employees base their relationship on gift exchanges is corroborated. Moreover, the fact that elements peculiar to the firm's environment conditions both the perception of fairness and the choice to implement rent-sharing schemes make the fair-wage effort hypothesis a suitable explanation of the persistence of non-compensating wage differentials among industries and firms. Since the norm considered as fair is not only defined at the level of the firm (according to its age, size, the employee's seniority, etc…) but also conditions the reward behaviors, two similar employees belonging to different firms may rationally receive a rather different compensation.

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**Appendix 1: Employer's utility function when paired with a reciprocity motivated employee : demonstration.**

For $Y_L > \frac{2C(\bar{e})}{\bar{e}(q-\bar{w})(\bar{w}-\underline{w}-C(\bar{e}))}$, that is when coupled with an unambiguously fair employee.

In that case, the employer can give at least $\underline{w}$ and a maximum of $\bar{w}-C(\bar{e})$ to a reciprocity motivated the employee. The *equitable payoff* is then defined by $\pi_L^{eq}=\frac{1}{2}(\bar{w}+\underline{w}-C(\bar{e}))$, and the employer's kindness of proposing $\bar{w}$ is: $\kappa_{EL}^{\bar{w}}=\frac{1}{2}(\bar{w}-\underline{w}-C(\bar{e}))$ and his kindness (or unkindness) of proposing a low wage offer is : $\kappa_{EL}^{\underline{w}}=-\frac{1}{2}(\bar{w}-\underline{w}-C(\bar{e}))$.

As in the investigation of the employee's behavior, one needs to give an expression of the employer's belief on employee's kindness to write his utility function. For that purpose one need the employer's belief on worker's belief on his choice. Let's call **ε** this second order belief of proposing $\bar{w}$. In this case, the employer thinks that the worker gives him ε'' $\bar{e}$ (q- $\bar{w}$) + (1 - ε'') 0 choosing her equilibrium strategy $\{(\bar{w},\bar{e}),(\underline{w},\underline{e})\}$. If the worker always chooses the high effort level whatever the offer, the employer can get a material payoff of ε'' $\bar{e}$ (q- $\bar{w}$) + (1 - ε'') $\bar{e}$ (q- $\underline{w}$) and on the contrary, if the worker always shirks, he gets a zero material payoff. The *equitable payoff* is then $\pi_E^{eq}=\frac{1}{2}\left[\varepsilon''\bar{e}(q-\bar{w})+(1-\varepsilon'')\bar{e}(q-\underline{w})+0\right]$

Employer's belief on employee's kindness toward him when she shirks when proposed $\underline{w}$ and selects $\bar{e}$ when proposed $\bar{w}$ ( $\lambda_{ELE}^{\{(\underline{w},\underline{e});(\bar{w},\bar{e})\}}$ ) can be expressed as the employer's material payoff when his opponent is reciprocity motivated minus the *equitable payoff* from the employer's point of view, provided that we are now on the first nod of the game tree. $\lambda_{ELE}^{\{(\underline{w},\underline{e});(\bar{w},\bar{e})\}}$ can be expressed as follows :

$$\lambda_{ELE}^{\{(\underline{w},\underline{e});(\bar{w},\bar{e})\}}=\frac{1}{2}\varepsilon''\bar{e}(q-\bar{w})-\frac{1}{2}(1-\varepsilon'')\bar{e}(q-\underline{w})$$ [10]

Given $\kappa_{EL}^{a_i}$, $a_i \in \{\bar{w},\underline{w}\}$ and $\lambda_{ELE}^{\{(\underline{w},\underline{e});(\bar{w},\bar{e})\}}$, the employer's modified utility function can be expressed as follows :

**- if he proposes $\bar{w}$ :**

$U_E^{\bar{w}}=\pi_E(\bar{w},\bar{e})+Y_E\kappa_{EL}^{\bar{w}}\lambda_{ELE}^{\{(\bar{w},\bar{e});(\underline{w},\underline{e})\}}$, which yields :

$$U_E^{\bar{w}}=\varepsilon''\bar{e}(q-\bar{w})+\frac{1}{4}Y_E\left[\varepsilon''\bar{e}(q-\bar{w})(\bar{w}-\underline{w}-C(\bar{e}))-(1-\varepsilon'')\bar{e}(q-\underline{w})(\bar{w}-\underline{w}-C(\bar{e}))\right]$$

**- if he proposes $\underline{w}$ :**

$U_E^{\underline{w}}=\pi_E(\underline{w},\underline{e})+Y_E\kappa_{EL}^{\underline{w}}\lambda_{ELE}^{\{(\bar{w},\bar{e});(\underline{w},\underline{e})\}}$, which yields :

$$U_E^{\underline{w}}=-\frac{1}{4}Y_E\left[\varepsilon''\bar{e}(q-\bar{w})(\bar{w}-\underline{w}-C(\bar{e}))-(1-\varepsilon'')\bar{e}(q-\underline{w})(\bar{w}-\underline{w}-C(\bar{e}))\right]$$

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[10] $\lambda_{ELE}$ is unique because a reciprocity motivated employee plays only one equilibrium strategy $\{(\underline{w},\underline{e});(\bar{w},\bar{e})\}$

## Appendix 2: Estimation of the employer's perception of the employee's degree of fairness

| Binomial **PROBIT** model:<br>Dependent variable: **CLIMAT**, "*The social climate in the firm has been good during the past three years*".<br>Estimation by maximum likelihood | |
|---|---|
| Number of observations: | 1761 |
| Log Likelihood (Log L): | -652,9314 |
| Restricted Log Likelihood (Log $L_R$): | -721,1902 |
| Pseudo $R^2$: | 9,46% |
| Percentage of correctly predicted variables | 85,92% |
| Degrees of freedom | 17 |
| LR test statistic (restricted model against non restricted) | 136,5177 |
| Significaance | 0,0000000 |
| Log likelihood with correction of heteroskedasticity | -636,8143 |
| $LR_H$ test statistic | 32,2342 |
| Significance | 0.0014 |
| LM test statistic | 103,9354 |
| Significance | 0,0000000 |

| Variable | Designation | Coef | Std | t | P[\|Z\|>z] |
|---|---|---|---|---|---|
| **ONE** | *Constant* | **1,179**$^{***}$ | 0,285 | 4,140 | **0,0000** |
| **PRIVE** | *The firm belongs to the private sector: 1 for: yes* | **0,251** | 0,162 | 1,549 | **0,1213** |
| **LOGAGE** | *Logarithm of the firm's age* | **-0,208**$^{**}$ | 0,096 | -2,157 | **0,0310** |
| **LOGSALET** | *Logarithm of the number of employees* | **-0,140**$^{***}$ | 0,038 | -3,739 | **0,0002** |
| **CAPAMOB** | *It's the capacity of the employees to mobilize themselves that determines the credibility of their representatives1 for: yes* | **-0,448**$^{**}$ | 0,196 | -2,286 | **0,0223** |
| **EVCOUVR** | *During the last 3 years, the number of workers (blue collar) has increased: 1 for: yes* | **0,340**$^{***}$ | 0,105 | 3,241 | **0,0012** |
| **EVCADRR** | *During the last 3 years, the number of white collars has increased: 1 for: yes* | **-0,216**$^{**}$ | 0,087 | -2,473 | **0,0134** |
| **CROISS** | *During the last 3 years, the firm's activity has greatly increased: 1 for: yes* | **0,580**$^{***}$ | 0,110 | 5,290 | **0,0000** |
| **STABLE** | *During the last 3 years, the firm's activity has remained stable: 1 for: yes* | **0,418**$^{***}$ | 0,115 | 3,636 | **0,0003** |
| **VARIAT** | *In 1998, there's been an unusual variation in the firm's activity: 1 for: yes* | **-0,250**$^{***}$ | 0,082 | -3,053 | **0,0023** |
| **CHPSAL** | *During the last 3 years, there's been radical compensation policy changes: 1 for: yes* | **-0,244**$^{**}$ | 0,110 | -2,211 | **0,0270** |
| **PRIMI** | *In 1998, all the employees have been offered individual performance related premiums: 1 for: yes* | **0,168**$^{**}$ | 0,083 | 2,017 | **0,0437** |
| **CSALAIR** | *In 1998, the white collar have received a general raise: 1 for: yes* | **0,132**$^{*}$ | 0,080 | 1,651 | **0,0988** |
| **ECVSAL** | *The firm spreads information on the wages evolutions:1 for: yes* | **0,228**$^{***}$ | 0,079 | 2,884 | **0,0039** |
| **INDTURN** | *The employer considers the level of employment turnover in the firm as the main indicator of the social climate:1 for: yes* | **0,419**$^{**}$ | 0,205 | 2,044 | **0,0410** |
| **CRAINEMP** | *It's the threat of being laid off that motivates the employee in her work:* | **0,187**$^{ns}$ | 0,128 | 1,463 | **0,1434** |
| **NCMANREC** | *It's the lack of recognition that demobilizes the employees:* | **-0,235**$^{**}$ | 0,105 | -2,233 | **0,0255** |
| **QUALTOT** | *The firm is involved into a total quality policy.* | **0,121**$^{ns}$ | 0,083 | 1,446 | **0,1482** |

| | **Predicted** | | |
|---|---|---|---|
| **Actual** | **0** | **1** | **Total** |
| **0** | 7 | 244 | 251 |
| **1** | 4 | 1506 | 1510 |
| **Total** | 11 | 1750 | 1761 |

**Appendix 3 : Descriptive statistics, variables used in the estimation of the employer's perception of the social climate**

| Variable | Designation | Mean | Std | Min | Max | Nb obs |
|---|---|---|---|---|---|---|
| **PRIVE** | *The firm belongs to the private sector: 1 for: yes* | 0,947 | 0,223 | 0 | 1 | 1786 |
| **LOGAGE** | *Logarithm of the firm's age* | 1,158 | 0,451 | 0 | 1,609 | 1782 |
| **LOGSALET** | *Logarithm of the number of employees* | 4,803 | 1,112 | 2,996 | 9,210 | 1792 |
| **CAPAMOB** | *It's the capacity of the employees to mobilize themselves that determines the credibility of their representatives 1 for: yes* | 0,030 | 0,171 | 0 | 1 | 1792 |
| **EVCOUVR** | *During the last 3 years, the number of workers (blue collar) has increased: 1 for: yes* | 0,245 | 0,430 | 0 | 1 | 1792 |
| **EVCADRR** | *During the last 3 years, the number of white collars has increased: 1 for: yes* | 0,317 | 0,465 | 0 | 1 | 1792 |
| **CROISS** | *During the last 3 years, the firm's activity has greatly increased: 1 for: yes* | 0,538 | 0,499 | 0 | 1 | 1778 |
| **STABLE** | *During the last 3 years, the firm's activity has remained stable: 1 for: yes* | 0,323 | 0,468 | 0 | 1 | 1778 |
| **VARIAT** | *In 1998, there's been an unusual variation in the firm's activity: 1 for: yes* | 0,410 | 0,492 | 0 | 1 | 1792 |
| **CHPSAL** | *During the last 3 years, there's been radical compensation policy changes: 1 for: yes* | 0,130 | 0,336 | 0 | 1 | 1792 |
| **PRIMI** | *In 1998, all the employees have been offered individual performance related premiums: 1 for: yes* | 0,643 | 0,479 | 0 | 1 | 1792 |
| **CSALAIR** | *In 1998, the white collar have received a general raise: 1 for: yes* | 0,502 | 0,500 | 0 | 1 | 1792 |
| **ECVSAL** | *The firm spreads information on the wages evolutions: 1 for: yes* | 0,547 | 0,498 | 0 | 1 | 1792 |
| **INDTURN** | *The employer considers the level of employment turnover in the firm as the main indicator of the social climate: 1 for: yes* | 0,058 | 0,234 | 0 | 1 | 1792 |
| **CRAINEMP** | *It's the threat of being laid off that motivates the employee in her work: 1 for: yes* | 0,119 | 0,324 | 0 | 1 | 1792 |
| **NCMANREC** | *It's the lack of recognition that demobilizes the employees: 1 for: yes.* | 0,148 | 0,355 | 0 | 1 | 1792 |
| **QUALTOT** | *The firm is involved into a total quality policy: 1 for: yes.* | 0,590 | 0,492 | 0 | 1 | 1792 |

**Appendix 4 : Descriptive statistics, variables used in the estimation of the probability to introduce the rent-sharing**

| Variable | Designation | Mean | Std | Min | Max | Nb obs |
|---|---|---|---|---|---|---|
| PRIVE | *The firm belongs to the private sector* | 0,947 | 0,223 | 0 | 1 | 1786 |
| FEMMES | *Percentage of women in the firm* | 37,272 | 28,575 | 0 | 100 | 1669 |
| LOGSALET | *Logarithm of the number of employees in the firm* | 4,803 | 1,112 | 2,996 | 9,210 | 1792 |
| LOGAGE | *Logarithm of the age of the firm* | 1,158 | 0,451 | 0 | 1,609 | 1782 |
| MULTI | *The firm has multiple firms* | 0,592 | 0,492 | 0 | 1 | 1792 |
| SOUTRAI | *During the past 3 years, you greatly developed subcontracting and externalization: 1 for: yes* | 0,243 | 0,429 | 0 | 1 | 1792 |
| QUALTOT | *The firm has adopted a total quality policy.* | 0,590 | 0,492 | 0 | 1 | 1792 |
| CLIENT | *In 1998, the main client represented at least 25% of the firm's activity: 1 for: yes.* | 0,598 | 0,490 | 0 | 1 | 1685 |
| STRATPRI | *In order to compete with the other firms did you set a strategy based on price competition for your main activity? 1 for: yes* | 0,195 | 0,397 | 0 | 1 | 1792 |
| DIFRECR | *In 1998, The employer had difficulties to hire some categories of employees: 1 for: yes.* | 0,603 | 0,489 | 0 | 1 | 1792 |
| EVCOUVR | *During the last 3 years, the number of workers has increased: 1 for: yes* | 0,245 | 0,430 | 0 | 1 | 1792 |
| OBJCOUT | *In 1998, precise and quantified goals have been drawn in terms of wage costs: 1 for: yes* | 0,821 | 0,384 | 0 | 1 | 1792 |
| RESFI | *Your main criteria to decide for wage raises is the financial result of the firm: 1 for: yes* | 0,794 | 0,405 | 0 | 1 | 1792 |
| PRIMI | *In 1998, all the employes benefited from premiums related to their individual performance: 1 for: yes* | 0,643 | 0,479 | 0 | 1 | 1792 |
| PRIMCO | *In 1998, all the employes benefited from premiums related to collective performance: 1 for: yes* | 0,448 | 0,497 | 0 | 1 | 1792 |
| NAUGMI | *In 1998, the blue collars benefited from individualized raises others than premiums: 1 for: yes* | 0,737 | 0,440 | 0 | 1 | 1792 |
| INDPROD | *The employer considers the productivity level as the main criteria to judge the social climate in the firm: 1 for: yes* | 0,079 | 0,270 | 0 | 1 | 1792 |
| **PEMPLC** | *Employer's estimated probability: Probability to perceive a good social climate.* | 0,858 | 0,102 | 0,291 | 0,993 | 1761 |
| NCESPROM | *It's the hope of getting promoted that determines the implication of the blue collars in their work: 1 for: yes* | 0,097 | 0,296 | 0 | 1 | 1792 |
| NCMANREC | *It's the lack of recognition that demobilizes the blue collars: 1 for: yes.* | 0,148 | 0,355 | 0 | 1 | 1792 |
| EVEMP | *Informations on the evolution of the employment perspectives are given to the employees of the firm* | 0,646 | 0,478 | 0 | 1 | 1792 |
| NEGSL99 | *In 1998, there's been a negotiation with the representatives about the wages: 1 for: yes* | 0,591 | 0,492 | 0 | 1 | 1792 |
| HSUP | *During the 3 last years, there's been a conflict taking the form of extra hours refusals: 1 for: yes* | 0,040 | 0,195 | 0 | 1 | 1792 |

**Appendix 5 : Descriptive statistics, variables used in the estimation of the probability to observe productivity gains after the rent-sharing**

| Variable | Designation | Mean | Std | Min | Max | Nb obs |
|---|---|---|---|---|---|---|
| **CLOGMWAG** | *Logarithm of the employee's age (mean of the employees in the firm)* | 3,407 | 0,489 | 1,585 | 4,254 | 1544 |
| **CDIPLO** | *Highest diploma:*<br>*1 for: autodidact,*<br>*2 for: certificat d'études,*<br>*3 for: BEPC (TAFE)*<br>*4 for: CAP- BEP (TAFE, higher level)*<br>*5 for: Baccalauréat,(HSC)*<br>*6 for: Bac +2 (undergraduate)*<br>*7 for: Bac +3 ou +4(Bachelor or Masters' degree)*<br>*8 for: supérieur à Bac +4 (more than Master's degree)* | 4,099 | 1,299 | 0,816 | 8,414 | 1542 |
| **CFEMMES** | *Percentage of women in the firm* | 35,306 | 28,241 | 0 | 105,102 | 1546 |
| **CSTRATP** | *In order to compete with the other firms did you set a strategy based on price competition for your main activity?*<br>*1 for: yes* | 0,186 | 0,374 | 0 | 1,052 | 1546 |
| **CECOENT** | *Information about the economic situation of the firm is directly given to the employees* | 0,686 | 0,420 | 0 | 1,052 | 1546 |
| **CEVEMP** | *Information on the evolution of the employment perspectives are given to the employees of the firm* | 0,590 | 0,456 | 0 | 1,052 | 1546 |
| **CFORMPR** | *Information on the possibilities of training in the firm are given to the employees* | 0,561 | 0,466 | 0 | 1,052 | 1478 |
| **CLOGPRIM** | *Logarithm of the annual premiums received by the employee* | 7,067 | 2,853 | 0 | 11,251 | 1546 |
| **CLOGSALAI** | *Logarithm of the annual wage* | 8,405 | 1,158 | 4,131 | 10,893 | 1530 |
| **CMWNEG98** | *In 1998, there's been a negotiation with the representatives about the wages:*<br>*1 for: yes* | 0,656 | 0,428 | 0 | 1,052 | 1478 |
| **CMWCLIMAT** | *The employee considers the social climate as good:*<br>*1 for: yes* | 0,627 | 0,447 | 0 | 1,052 | 1546 |
| **CMWGAMB** | *It's the work atmosphere that demobilizes the employee:*<br>*1 for: yes* | 0,020 | 0,136 | 0 | 1,052 | 1546 |
| **CMWGAUTO** | *It's the lack of autonomy that demobilizes the employee:*<br>*1 for: yes* | 0,007 | 0,077 | 0 | 1,048 | 1546 |
| **CMWPROM** | *It's the hope of being promoted that conditions the employee's implication in her work:*<br>*1 for: yes* | 0,033 | 0,174 | 0 | 1,052 | 1546 |
| **CMWRISK** | *Subjective risk to be laid off:*<br>*1 for: the employee thinks he has a great chance to be laid off in the near future.*<br>*0 for: otherwise.* | 0,089 | 0,275 | 0 | 1,052 | 1546 |